Level 3 – 2003 PAAP Mathematics Rubric and Scoring Guide

adapted from the Maine Assessment Portfolio (MAP) General Content Area Rubrics

1 *Attempted Demonstration (little evidence)*	*2* *Partial Demonstration (some evidence)*	*3* *Proficient Demonstration (evidence meets standards)*	*4* *Sophisticated Demonstration (evidence exceeds standards)*	Learning Results Content Standards and Performance Indicators
No significant demonstration of any performance indicators from content standards A at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard A at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard A at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard A at Entry Level 3.	***Students will be able to:*** ***<u>Numbers and Number Sense</u> (A) – Understand and demonstrate a sense of what numbers mean and how they are used.*** **1. Use numbers in a variety of equivalent and interchangeable forms (e.g., integer, fraction, decimal, percent, exponential, and scientific notation) in problem-solving.** **2. Demonstrate understanding of the relationships among the basic arithmetic operations on different types of numbers.** **3. Apply concepts of ratios, proportions, percents, and number theory (e.g., primes, factors, and multiples) in practical and other mathematical solutions.** **4. Represent numerical relationships in graphs, tables, and charts.**
Employs inappropriate strategies and inaccurate or inappropriate application of computation skills.	Employs appropriate strategies, but includes some inaccurate and/or inappropriate application of computation skills.	Employs appropriate strategies and includes accurate, appropriate application of computation skills.	Employs sophisticated or efficient strategies and includes accurate, appropriate application of computation skills.	***Students will be able to:*** ***<u>Computation and Problem Solving</u> (B) – Students will understand and demonstrate computation skills.*** **1. Compute and model all four operations with whole numbers, fractions, decimals, sets of numbers, and percents, applying the proper order of operations.** **2. Create, solve, and justify the solution for multi-step, real-life problems including those with ration and proportion.**
No significant demonstration of any performance indicators from content standards C at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard C at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard C at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard C at Entry Level 3.	***Students will be able to:*** ***<u>Data Analysis and Statistics</u> (C) – Understand and apply concepts of data analysis.*** **1. Organize and analyze data using mean, median, mode, and range.** **2. Assemble data and use matrices to formulate and solve problems.** **3. Construct inferences and convincing arguments based on data.**
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No significant demonstration of any performance indicators from content standards D at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard D at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard D at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard D at Entry Level 3.	***Students will be able to:*** ***<u>Probability</u> (D)- Understand and apply concepts of probability.*** **1. Find the probability of simple events and make predictions by applying the theories of probability.** **2. Explain the idea that probability can be represented as a fraction between and including zero and one.** **3. Use simulations to estimate probabilities.** **4. Find all possible combinations and arrangements involving a limited number of variables.**
No significant demonstration of any performance indicators from content standards E at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard E at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard E at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard E at Entry Level 3.	***Students will be able to:*** ***<u>Geometry</u> (E) – Understand and apply concepts from geometry.*** **1. Compare, classify, and draw two dimensional shapes and three dimensional figures.** **2. Apply geometric properties to represent and solve real-life problems involving regular and irregular shapes.** **3. Use a coordinate system to define and locate position.** **4. Use the appropriate geometric tools and measurements to draw and construct two and three dimensional figures.**

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No significant demonstration of any performance indicators from content standards F at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard F at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard F at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard F at Entry Level 3.	***Students will be able to:*** ***<u>Measurement</u> (F) – Understand and demonstrate measurement skills.*** **1. Demonstrate the structure and use of systems of measurement.** **2. Develop and use concepts that can be measured directly, or indirectly (e.g., the concept of rate).** **3. Demonstrate an understanding of length, area, volume, and the corresponding units, square units, and cubic units of measure.**
No significant demonstration of any performance indicators from content standards G at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard G at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard G at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard G at Entry Level 3.	***Students will be able to:*** ***<u>Patterns, Relations, Functions</u> (G) – Understand that mathematics is the science of patterns, relationships, and functions.*** **1. Describe and represent relationships with tables, graphs, and equations.** **2. Analyze relationships to explain how a change in one quantity can result in a change in another.** **3. Use patterns and multiple representations to solve problems.**
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1 *Attempted Demonstration* *(little evidence)*	*2* *Partial Demonstration* *(some evidence)*	*3* *Proficient Demonstration* *(evidence meets standards)*	*4* *Sophisticated Demonstration* *(evidence exceeds standards)*	Learning Results Content Standards and Performance Indicators
No significant demonstration of any performance indicators from content standards H at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard H at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard H at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard G at Entry Level 3.	***Students will be able to:*** ***<u>Algebra Concepts</u> (H) – Understand an apply algebraic concepts.*** **1. Use the concepts of variables and expressions.** **2. Solve linear equations using concrete, informal, and formal methods which apply the order of operations.** **3. Analyze tables and graphs to identify properties and relationships in a practical content.** **4. Use graphs to represent two-variable equations.** **5. Demonstrate an understanding of inequalities and non-linear equations.** 6. **Find solutions for unknown quantities in linear equations and in simple equations and inequalities.**
No significant demonstration of any performance indicators from content standards I at Entry Level 3.	Some demonstration of performance indicator(s) # ____ from content standard I at Entry Level 3.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard I at Entry Level 3.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard I at Entry Level 3.	***Students will be able to:*** ***<u>Discrete Mathematics</u> (I) – Understand and apply concepts in discrete mathematics.*** **1. Create and use networks to explain practical situations or solve problems.** **2. Identify patterns in the world and express these patterns with rules.**
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No significant demonstration of any performance indicators from content standards A at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard A at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard A at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard A at Entry Level 4.	***Students will be able to:*** ***<u>Numbers and Number Sense</u> (A) – Understand and demonstrate a sense of what numbers mean and how they are used.*** **1. Describe the structure of the real number system and identify its appropriate applications and limitations.** **2. Explain what complex numbers (real and imaginary) mean and describe some of their many uses.**
Employs inappropriate strategies and inaccurate or inappropriate application of computation skills.	Employs appropriate strategies, but includes some inaccurate and/or inappropriate application of computation skills.	Employs appropriate strategies and includes accurate, appropriate application of computation skills.	Employs sophisticated or efficient strategies and includes accurate, appropriate application of computation skills.	***Students will be able to:*** ***<u>Computation and Problem Solving</u> (B) – Students will understand and demonstrate computation skills.*** **1. Uses various techniques to approximate solutions, determine the reasonableness of answers, and justify the results.** **2. Explain operations with number systems other than base ten.**
No significant demonstration of any performance indicators from content standards C at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard C at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard C at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard C at Entry Level 4.	***Students will be able to:*** ***<u>Data Analysis and Statistics</u> (C) – Understand and apply concepts of data analysis.*** **1. Determine and evaluate the effect of variables on the results of data collection.** **2. Predict and draw conclusions from charts, tables, and graphs that summarize data from practical situations.** **3. Demonstrate an understanding of concepts of standard deviation and correlation and how they relate to data analysis.** **4. Demonstrate an understanding of the idea of random sampling and recognition of its role in statistical claims and designs for data collection.** **5. Revise studies to improve their validity (e.g., in terms of better sampling, better controls, or better data analysis techniques).**
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No significant demonstration of any performance indicators from content standards D at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard D at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard D at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard D at Entry Level 4.	***Students will be able to:*** ***<u>Probability</u> (D)- Understand and apply concepts of probability.*** **1. Find the probability of compound events and make predictions by applying probability theory.** **2. Create and interpret probability distributions.**
No significant demonstration of any performance indicators from content standards E at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard E at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard E at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard E at Entry Level 4.	***Students will be able to:*** ***<u>Geometry</u> (E) – Understand and apply concepts from geometry.*** **1. Draw coordinate representations of geometric figures and their transformations.** **2. Use inductive and deductive reasoning to explore and determine the properties of and relationships among geometric figures.** **3. Apply trigonometry to problem situations involving triangles and periodic phenomena.**
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No significant demonstration of any performance indicators from content standards F at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard F at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard F at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard F at Entry Level 4.	***Students will be able to:*** ***<u>Measurement</u> (F) – Understand and demonstrate measurement skills.*** **1. Use measurement tools and units appropriately and recognize limitations in the precision of the measurement tools.** **2. Derive and use formulas for area, sue area, and volume of many types of figures.**
No significant demonstration of any performance indicators from content standards G at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard G at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard G at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard G at Entry Level 4.	***Students will be able to:*** ***<u>Patterns, Relations, Functions</u> (G) – Understand that mathematics is the science of patterns, relationships, and functions.*** **1. Create a graph to represent a real-life situation and draw inferences from it.** **2. Translate and solve a real-life problem using symbolic language.** **3. Model phenomena using a variety of functions (linear, quadratic, exponential, trigonometric, etc.** **4. Identify a variety of siturations explained by the same type of function.**
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No significant demonstration of any performance indicators from content standards H at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard H at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard H at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard G at Entry Level 4.	***Students will be able to:*** ***<u>Algebra Concepts</u> (H) – Understand an apply algebraic concepts.*** **1. Use tables, graphs, and spreadsheets to interpret expressions, equations, and inequalities.** **2. Investigate concepts of variation by using equations, graphs, and data collection.** **3. Formulate and solve equations and inequalities.** **4. Analyze and explain situations using symbolic representations.**
No significant demonstration of any performance indicators from content standards I at Entry Level 4.	Some demonstration of performance indicator(s) # ____ from content standard I at Entry Level 4.	Accurate, appropriate demonstration of performance indicator(s) #_____ from content standard I at Entry Level 4.	Exceeds expectations in demonstrating performance indicator(s) #_____ from content standard I at Entry Level 4.	***Students will be able to:*** ***<u>Discrete Mathematics</u> (I) – Understand and apply concepts in discrete mathematics.*** ***1.* Use linear programming to find optimal solutions to a system.** **2. Use networks to find solutions to problems.** **3. Apply strategies from game theory to problem-solving situations.** **4. Use matrices as tools to interpret and solve problems.**
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